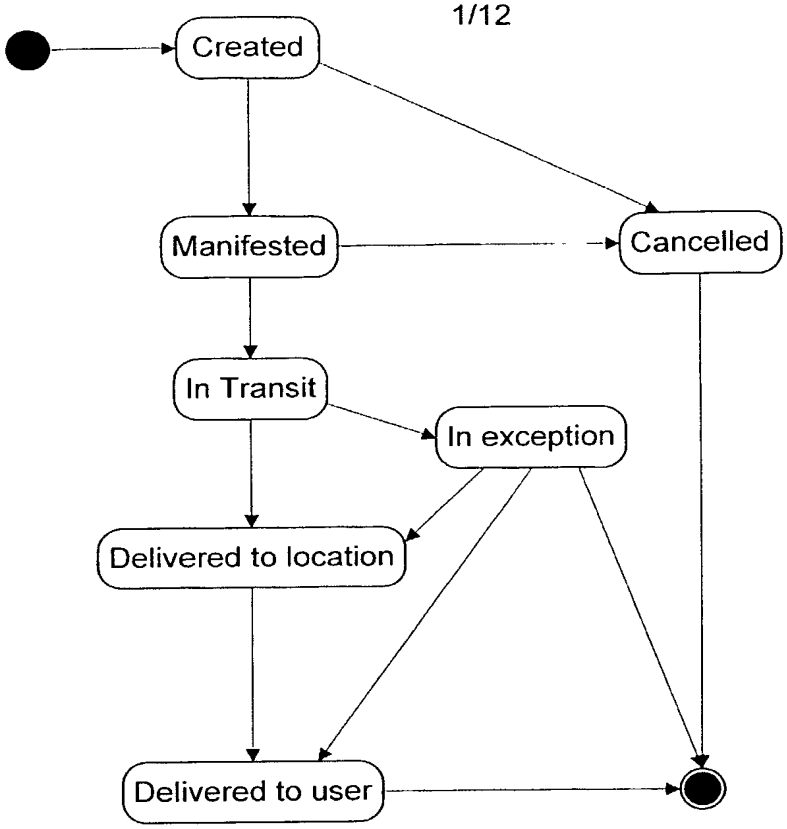
Created
Manifested
Cancelled
In Transit
In exception
Delivered to location
Delivered to user

Fig. 1

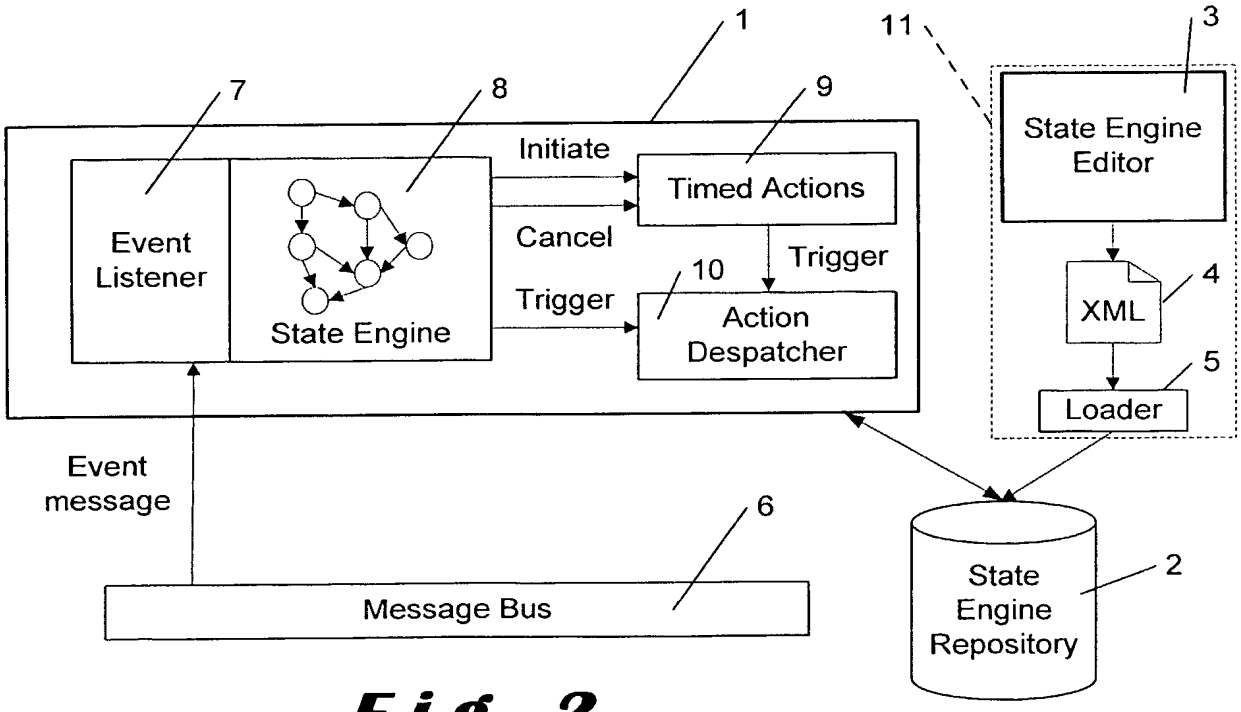
1
11
3
7
8
9
State Engine Editor
Initiate
Timed Actions
Event Listener
Cancel
Trigger
10
Trigger
Action Despatcher
State Engine
XML
4
5
Loader
Event message
6
State Engine Repository
2
Message Bus

Fig. 2

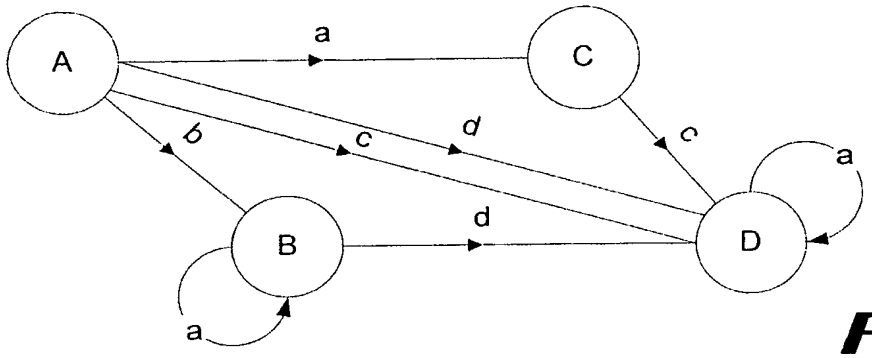

Fig. 3

Current State / Incoming Event	State A	State B	State C	State D
Event a	New Sate: State C Action 1 Action 2 Timed Action 1	Action 7 Timed Action 2		Action 1
Event b	New State: State B Action 3 Timed Action 2 Timed Action 3			
Event c	New State: State D Action 4 Action 5 Action 6		New State: State D Action 4 Action 5	
Event d	New State: State D Action 5	New State: State D Action 3 Action 5		

Fig. 4

Element	Description
<BPSE>	Global element for the business process state engine repository
<ObjectTypes>	Definition of object types
<ObjectType xid=string>	Unique Ref ID of the object type (system generated)
<Name>string</Name>	Name of the object type
<Description>string</Description>	Description of the object type
</ObjectType>	
<ObjectType xid=string>	
...	
</ObjectTypes>	
<Diagrams>	Definition of state diagrams
<Diagram xid=string>	Unique Ref ID of the diagram (system generated)
<Name>string</Name>	Name of the diagram
<Description>string</Description>	Description of the diagram
<ObjectTypeRef xid=string>	Ref of the object type on which the diagram applies
</Diagram>	
<Diagram xid=string>	
...	
</Diagrams>	
<States>	
<State xid=string>	Unique Ref ID of the state (system generated)
<Name>string</Name>	Name of the state
<Description>string</Description>	Description of the state
<DiagramRef xid=string>	Ref to the diagram to which the state belongs
</State>	
<State xid=string>	
...	
</States>	
<Events>	
<Event xid=string>	Unique Ref ID of the event (system generated)
<Name>string</Name>	Name of the event
<Description>string</Description>	Description of the event
<ObjectTypeRef xid=string>	Object type on which event is applicable
</Event>	
<Event xid=string>	
...	
</Events>	

Fig. 5a

<Actions>	
<Action xid=string>	Unique Ref ID of the action (system generated)
<Name>string</Name>	Name of the action
<Description>string</Description>	Description of the action
<ObjectTypeRef xid=string>	Object types on which action is applicable (optional)
</Action>	
<Action xid=string>	
...	
</Actions>	
<TimedActions>	
<TimedAction xid=string>	Unique Ref ID of the timed action (system generated)
<Name>string</Name>	Name of the timedaction
<Description>string</Description>	Description of the timed action
<ObjectTypeRef xid=string>	Object types on which timed action is applicable (optional)
<TimeOut>string</TimeOut>	Time when action(s) will fire (dd hh:mm)
<Actions>	Action(s) that will fire when timeout expires
<Action xid=string />	Ref to the action to be fired
...	
</Actions>	
</TimedAction>	
<TimedAction xid=string>	
...	
</TimedActions>	
<Transitions>	
<Transition xid=string>	
<TriggeringEvent xid=string />	Ref to the event that triggers the transition
<Diagram xid=string />	Ref to the state digram to which the transition belongs
<Source xid=string />	Ref to the source state of the transition
<Target xid=string />	Ref to the target state of the transition
<Actions>	Ref to the actions to be taken when transition occurs
<Action xid=string />	
...	
</Actions>	
<TimedActions>	Ref to timed actions to be scheduled
<TimedAction xid=string>	
...	
</TimedActions>	
</Transitions>	
</BPSE>	

Fig. 5b

Element	Description
<EventMessage>	Global element for the event message
<Header>	Event header information
<Origin>string</Origin>	Origin (system that generated the message on the bus)
<MessageDateTime>string</MessageDateTime>	When the message was sent (DD-MM-YYY HH:MM:SS)
<EventType>string</EventType>	What type of event
<EventDateTime>string</SendDateTime>	When the orginal event was created (DD-MM-YYY HH:MM:SS)
<Location>string</Location>	Where the event was created
<User>string</User>	Who created the event
<Reason>string</Reason>	Why the event was created
<Method>string</Method>	How the event was created
<ObjectType>string</ObjectType>	Object type on which the event applies
<ObjectID>string</ObjectID>	Object ID on which the event applied
</Header>	
<Object>	Specific Object data associated with the event - format specific to the object type
<ObjectData1>….<ObjectData1>	Object specific data
…	
<ObjectDataN>….<ObjectDataN>	Object specific data
</Object>	
</EventMessage>	

Fig. 5c

Element	Description
<ActionMessage>	Global element for the action message
<Header>	Action header information
<Origin>string</Origin>	Origin (system that generated the message on the bus)
<MessageDateTime>string</MessageDateTime>	When the message was sent (DD-MM-YYY HH:MM:SS)
<ActionType>string</ActionType>	What type of action
<Reason>string</Reason>	Why the action was triggered
<ObjectType>string</ObjectType>	Object type on which the action applies
<ObjectID>string</ObjectID>	Object ID on which the action applies
</Header>	
<Object>	Specific Object data associated with the event - format specific to the object type
<ObjectData1>….<ObjectData1>	Object specific data
…	
<ObjectDataN>….<ObjectDataN>	Object specific data
</Object>	
</ActionMessage>	

Fig. 5d

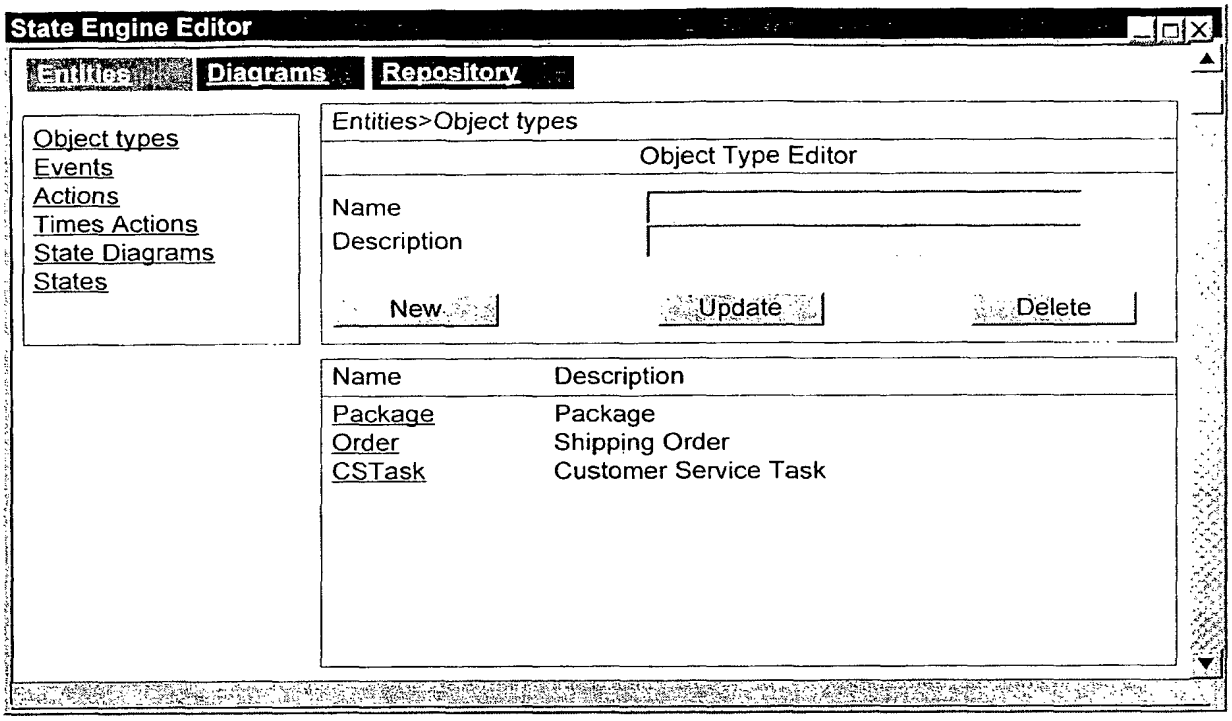
State Engine Editor
Entities
Diagrams
Repository
Object types
Events
Actions
Times Actions
State Diagrams
States
Entities>Object types
Object Type Editor
Name
Description
New
Update
Delete
Name
Description
Package
Package
Order
Shipping Order
CSTask
Customer Service Task

Fig. 6

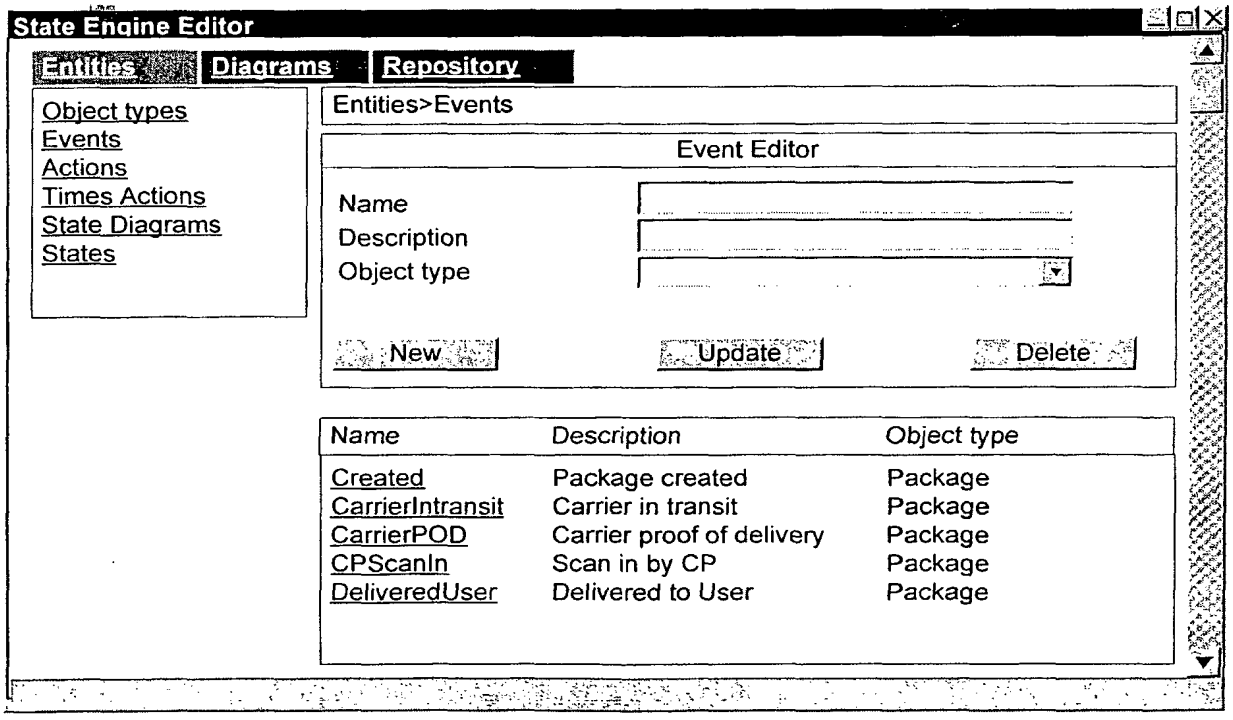
State Engine Editor
Entities
Diagrams
Repository
Object types
Events
Actions
Times Actions
State Diagrams
States
Entities>Events
Event Editor
Name
Description
Object type
New
Update
Delete
Name
Description
Object type
Created
Package created
Package
CarrierIntransit
Carrier in transit
Package
CarrierPOD
Carrier proof of delivery
Package
CPScanIn
Scan in by CP
Package
DeliveredUser
Delivered to User
Package

Fig. 7

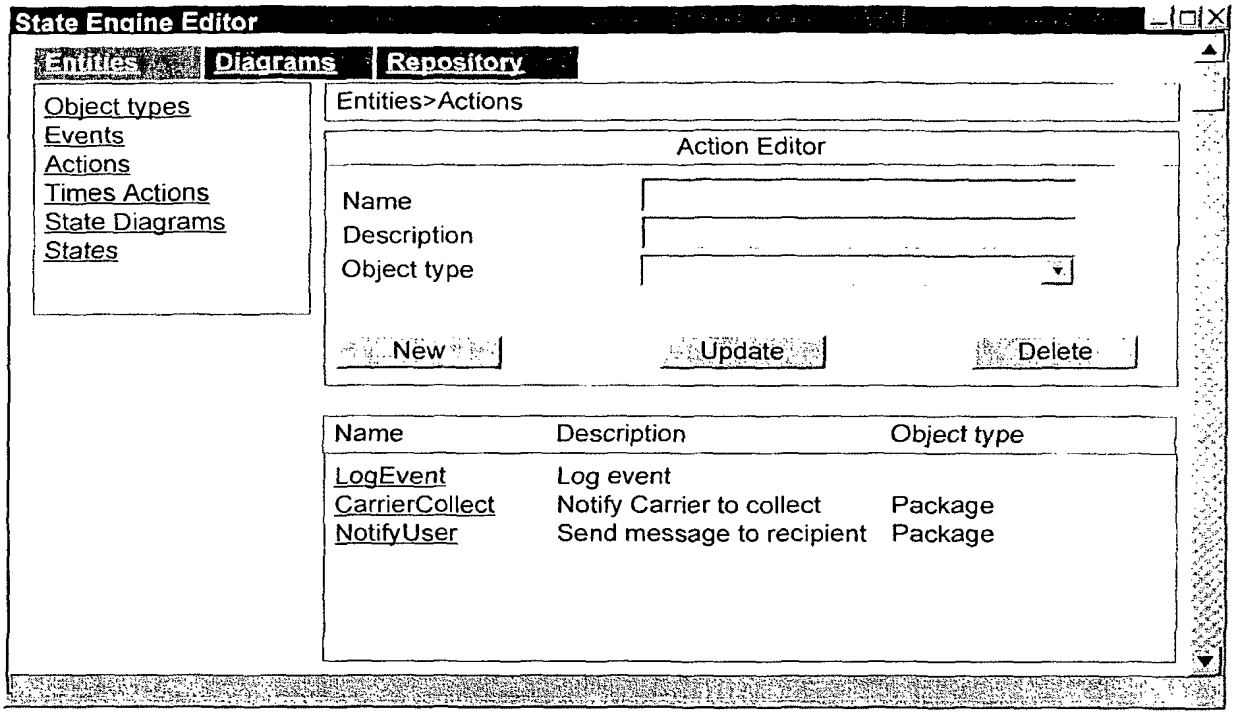
State Engine Editor
Entities
Diagrams
Repository
Object types
Events
Actions
Times Actions
State Diagrams
States
Entities>Actions
Action Editor
Name
Description
Object type
New
Update
Delete
Name
Description
Object type
LogEvent
Log event
CarrierCollect
Notify Carrier to collect
Package
NotifyUser
Send message to recipient
Package

Fig. 8

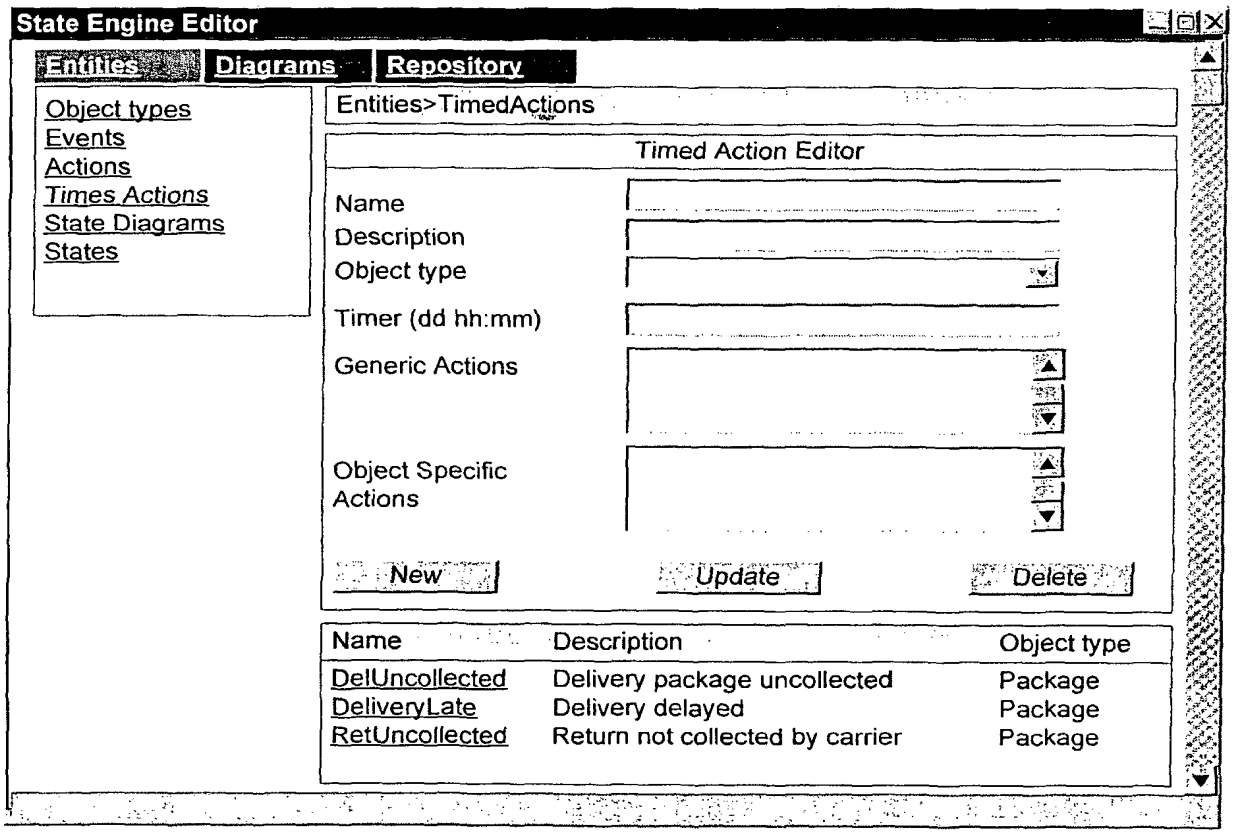
State Engine Editor
Entities
Diagrams
Repository
Object types
Events
Actions
Times Actions
State Diagrams
States
Entities>TimedActions
Timed Action Editor
Name
Description
Object type
Timer (dd hh:mm)
Generic Actions
Object Specific Actions
New
Update
Delete
Name
Description
Object type
DelUncollected
Delivery package uncollected
Package
DeliveryLate
Delivery delayed
Package
RetUncollected
Return not collected by carrier
Package

Fig. 9

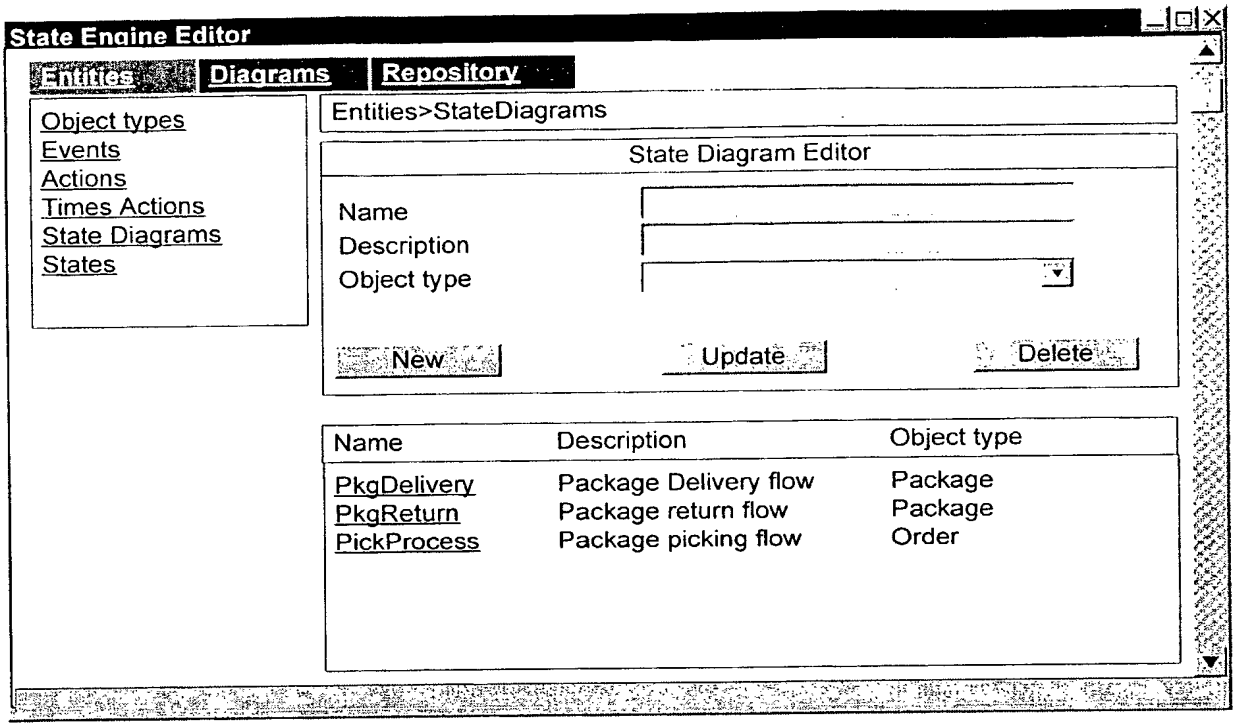
State Engine Editor
Entities
Diagrams
Repository
Object types
Events
Actions
Times Actions
State Diagrams
States
Entities>StateDiagrams
State Diagram Editor
Name
Description
Object type
New
Update
Delete
Name
Description
Object type
PkgDelivery
Package Delivery flow
Package
PkgReturn
Package return flow
Package
PickProcess
Package picking flow
Order

Fig. 10

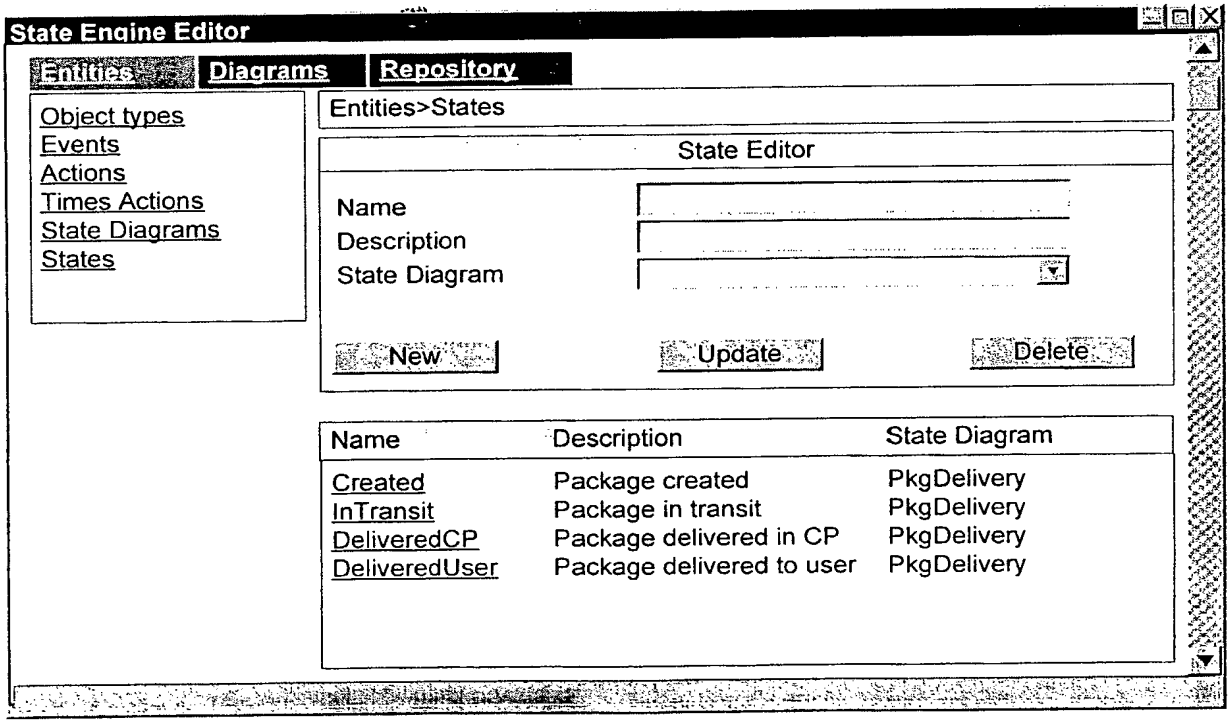
State Engine Editor
Entities
Diagrams
Repository
Object types
Events
Actions
Times Actions
State Diagrams
States
Entities>States
State Editor
Name
Description
State Diagram
New
Update
Delete
Name
Description
State Diagram
Created
Package created
PkgDelivery
InTransit
Package in transit
PkgDelivery
DeliveredCP
Package delivered in CP
PkgDelivery
DeliveredUser
Package delivered to user
PkgDelivery

Fig. 11

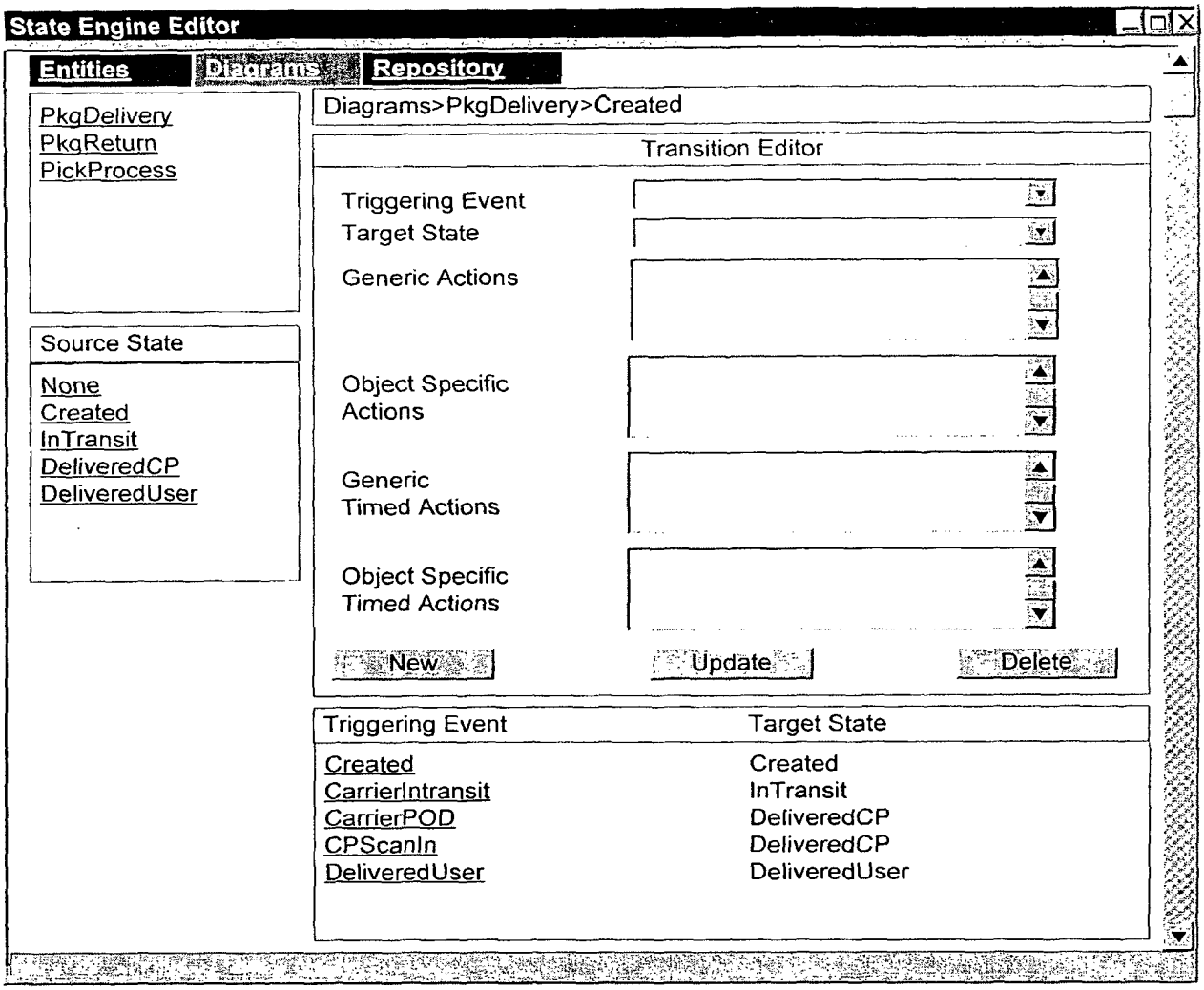
State Engine Editor
Entities
Diagrams
Repository
PkgDelivery
PkgReturn
PickProcess
Diagrams>PkgDelivery>Created
Transition Editor
Triggering Event
Target State
Generic Actions
Object Specific Actions
Generic Timed Actions
Object Specific Timed Actions
New
Update
Delete
Source State
None
Created
InTransit
DeliveredCP
DeliveredUser
Triggering Event
Target State
Created
CarrierIntransit
CarrierPOD
CPScanIn
DeliveredUser
Created
InTransit
DeliveredCP
DeliveredCP
DeliveredUser

Fig. 12

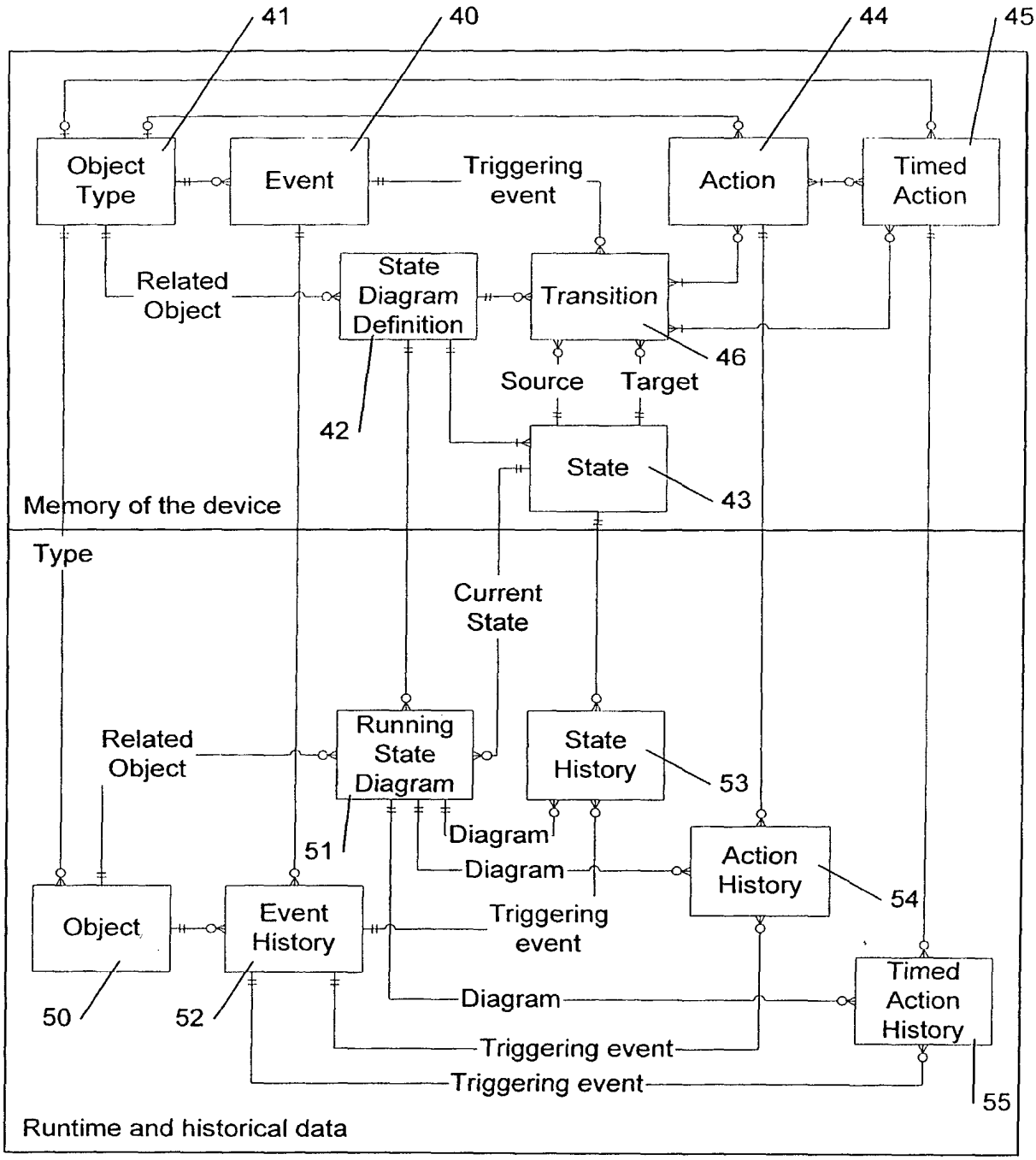
41
40
44
45
Object Type
Event
Triggering event
Action
Timed Action
Related Object
State Diagram Definition
Transition
46
Source
Target
42
State
43
Memory of the device
Type
Current State
Related Object
Running State Diagram
State History
53
51
Diagram
Diagram
Action History
54
Object
Event History
Triggering event
50
52
Diagram
Timed Action History
Triggering event
Triggering event
55
Runtime and historical data

Fig. 13

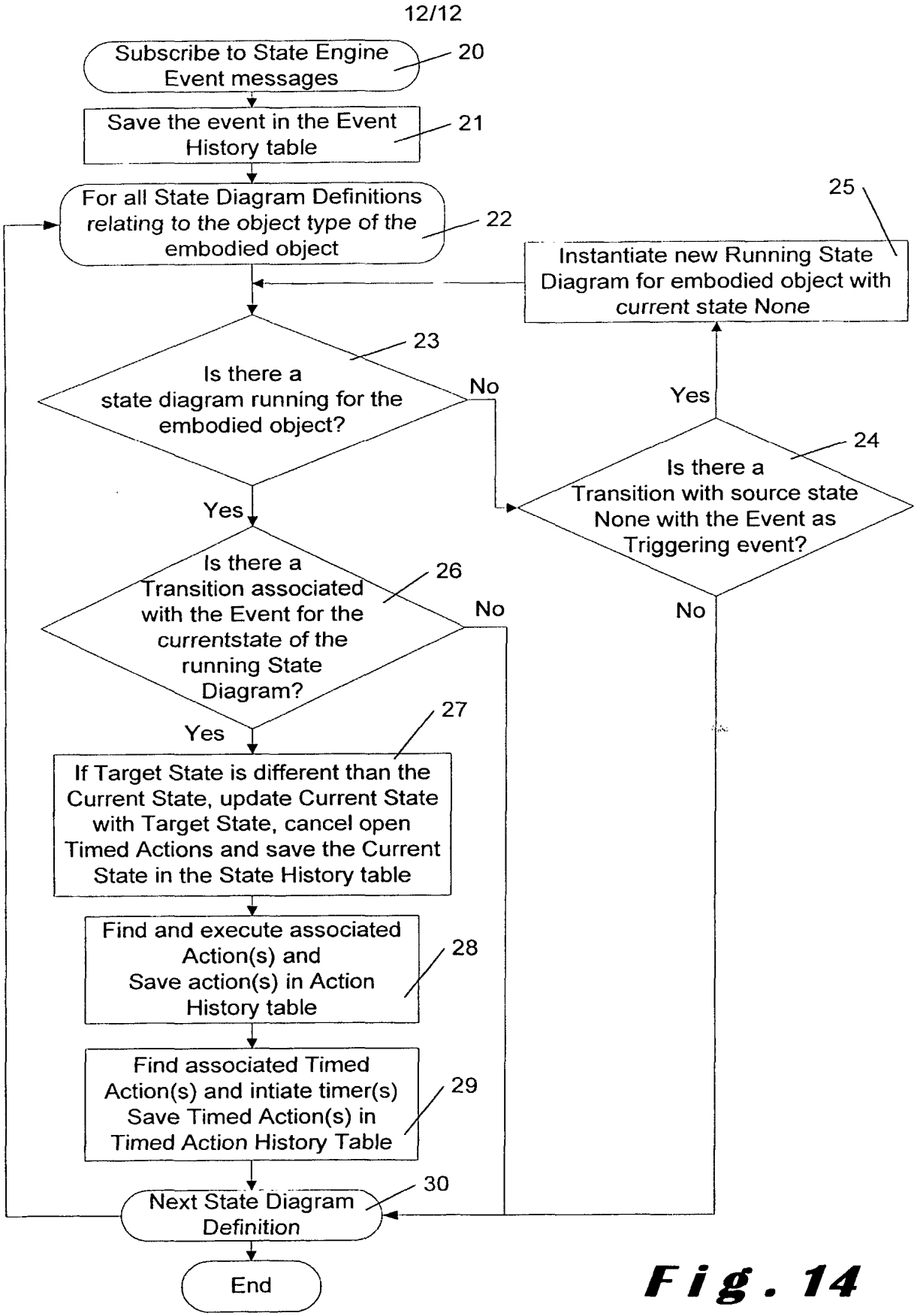
Subscribe to State Engine Event messages
20
Save the event in the Event History table
21
For all State Diagram Definitions relating to the object type of the embodied object
22
25
Instantiate new Running State Diagram for embodied object with current state None
Is there a state diagram running for the embodied object?
23
No
Yes
24
Is there a Transition with source state None with the Event as Triggering event?
Yes
Is there a Transition associated with the Event for the currentstate of the running State Diagram?
26
No
No
Yes
27
If Target State is different than the Current State, update Current State with Target State, cancel open Timed Actions and save the Current State in the State History table
Find and execute associated Action(s) and Save action(s) in Action History table
28
Find associated Timed Action(s) and intiate timer(s) Save Timed Action(s) in Timed Action History Table
29
Next State Diagram Definition
30
End

Fig. 14